EFFECTS OF DOPING AND DIMENSIONALITY ON THE MAGNETIC, STRUCTURAL, MORPHOLOGICAL AND SPIN DYNAMICS IN FERROMAGNETIC MICRO- AND NANOSTRUCTURES

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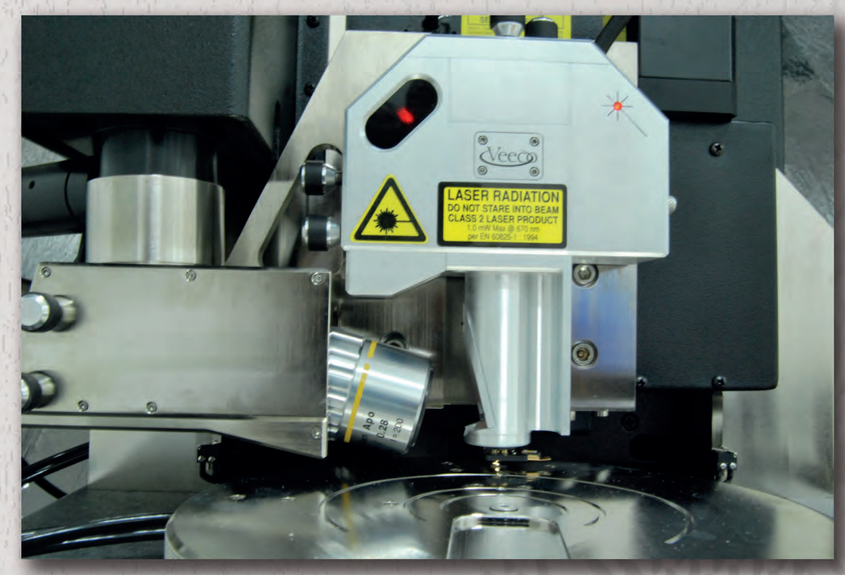
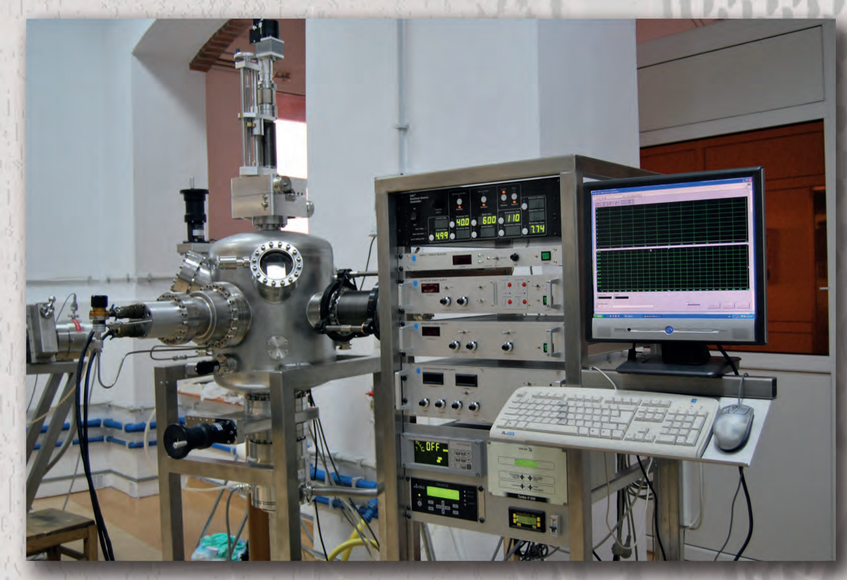


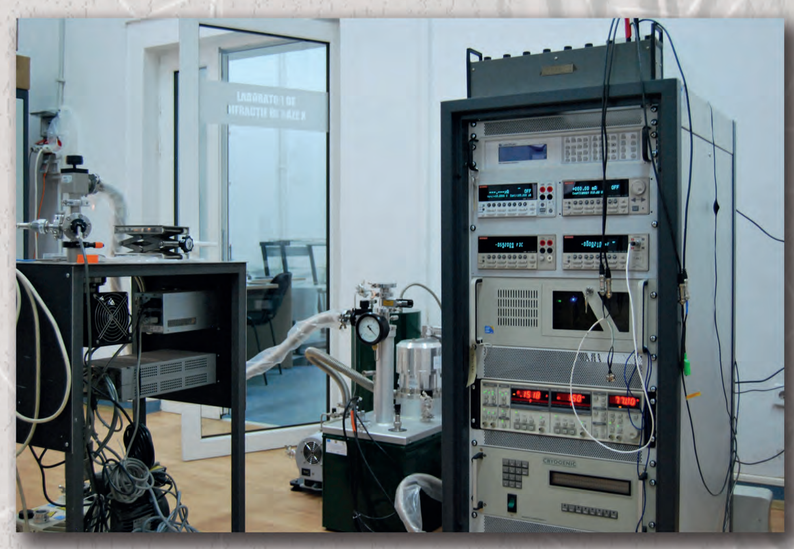
Objectives:

Synthesis of ferromagnetic oxides with modulated dimensionality: micro-and nano-particles, continuous and nano-patterned epitaxial thin films; structural, morphological, magnetic, electric and spin dynamic's characterization as a function of the system's dimensionality and doping degree; the study of the phase transitions in micro- and nano- patterned ferromagnetic oxides; theoretical modeling.



Achievements:

Diluted magnetic oxides (DMO) are expected to play an important role in interdisciplinary materials science and future electronics because charge and spin degree of freedom coexist into single material. The control of the high temperature ferromagnetism and of the spin and charge transport in DMO micro- and nanostructures represent a necessary condition for the achievement and miniaturization of spintronic devices which could operate at and above the ambient temperature. The project involved a competitive and complementary partnership within a complex ideeas proiect funded by CNCSIS between 2 Technical Universities and 4 National R&D Institutes and has the main goal to obtain top research results based on the experimental and theoretical researches which will be performed on micro- and nanostructured semiconducting ferromagnetic oxide systems synthesized by innovating methods. By means of that, we answered to the still controversial problems in the fundamental research referring to the effects induced by the low dimensionality, magnetic ions doping degree and by the synthesis methods on the propitious characteristics necessarily to get the high temperature ferromagnetism in II-VI oxide semiconductors.



Application fields:

The development of new classes of materials with applications in spintronics and the development of micro and nano-patterning versatile techniques opens new research and technology horizons. They concern the study and the control of materials properties at macro, micro and nano-scopic scale in order to develop new generations of systems and devices with predefined and controlled innovative functionality. A significant potential of integration of diluted oxide systems studied here in a new generation of spintronic devices is furthermore envisaged. Their operation is based on the properties of magnetization dynamics and its control by spin transfer effects. The project results were the subject of 5 patents proposals, 36 ISI papers with a cumulative impact factor of 65.1 and a relative influence score of 54.5, accumulating till now a total of 100 citations. Moreover, the project provides important perspectives for new directions of scientific research in the physics of materials, in general, and in the field of spintronics, in particular.

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